

**REMARKS**

**Status of the Abstract**

The abstract has been amended to recite the symbol “A” in line 13.

**Status of the Specification**

Paragraph [0032] of the specification has been amended to delete the second recitation of “such as” in line 11.

**Status of the Claims**

Claims 2, 13, 14, and 17 have been canceled. Claims 1 and 16 have been amended. Claim 1 has been amended to recite that, in addition to the carbon containing gas, the etching composition also comprises “a halogen-based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same; wherein the carbon containing gas is selected from the group consisting of: (i) gases having the chemical formula C<sub>x</sub>H<sub>y</sub>, wherein x is an integer ranging from 1 to 10, and Y is an integer ranging from 2 to 22; and (ii) gases having the chemical formula C<sub>x</sub>H<sub>y</sub>A, wherein x is an integer ranging from 1 to 10, Y is an integer ranging from 0 to 21, and A represents at least one additional substituent selected the group consisting of O, N, S, P, F, Cl, Br, I, and combinations of the same.” Claim 16 has been similarly amended. Support for these amendments can be found in originally filed claims 2 and 17.

**Objection to the Abstract**

The abstract was objected to because on line 13, symbol “A” was referred to as “a.” (Office Action, page 2). Applicants submit that this objection has been obviated in view of the amended abstract.

### **Objection to the Specification**

The specification was objected to because “such as” was mentioned twice in line 11 of paragraph [0032]. Applicants submit that this objection has been obviated in view of the amended specification.

### **Rejections Under 35 U.S.C. § 102**

Claims 1 and 16 were rejected under 35 U.S.C. § 102(b) “as being anticipated by Ding et al. [5,814,563].” (Office Action, page 3). Claims 13 and 14 were rejected under 35 U.S.C. § 102(e) “as being anticipated by Ko et al. [US 2005/0035409].” (*Id.*) Applicants submit that these rejections are traversed in view of the amended claims.

Specifically, claims 13 and 14 have been canceled and claims 1 and 16 have been amended to recite that the etching composition comprises, *inter alia*, “a halogen-based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same.” As noted by the Examiner, Ding et al. “did not disclose etching composition comprises a halogen based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same.” (Office Action, page 4). Thus, an etching composition comprising “a halogen based plasma; and a gas selected from the group consisting of O<sub>2</sub>,

N<sub>2</sub>, and mixtures of the same” is not taught or suggested by Ding et al. and, therefore, the reference cannot anticipate amended claims 1 and 16.

### Rejections Under 35 U.S.C. § 103

Claims 2-7 and 17-20 were rejected under 35 U.S.C. § 103 “as being unpatentable over Ding et al. [5,814,563] in view of Obeng [6,162,733].” (Office Action, page 4). The Examiner acknowledged that Ding et al. “did not disclose etching composition comprises a halogen based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same.” (*Id.*) However, the Examiner stated that “Obeng disclose etching composition comprises a halogen-based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same.” (*Id.*) The Examiner further took the position that “[i]t would have been obvious to one of ordinary skill in the art at the time of invention to modify the method of Ding et al. by adding etching composition comprises a halogen-based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same in order to remove contaminants.” (*Id.*) Applicants submit that this rejection has been traversed.

Ding et al. teach etching compositions comprising both a fluorohydrocarbon gas and an NH<sub>3</sub> generating gas. There is no teaching or suggestion from this reference that such combination could be further advantageously combined with *either* a halogen-based plasma or a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same,

let alone *both*. Likewise, there is no teaching or suggestion in Obeng et al. that its disclosed halogen-based plasma etch could be advantageously combined with the fluorohydrocarbon gas disclosed in Ding et al. For this reason alone, the Examiner has failed to set forth a *prima facie* case of obviousness.

Moreover, Applicants disagree with the Examiner's characterization of the teachings of Obeng et al. Obeng et al., does not, as the Examiner suggests, teach an etching composition comprising both a halogen-based plasma and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same. Instead, Obeng et al., specifically teach that the gas selected from, *inter alia*, O<sub>2</sub> and N<sub>2</sub> is ***not part of the etching composition*** but is, rather, to be introduced into a process chamber in a ***separate step*** from the halogen based plasma etch. (See, e.g., Obeng et al. col. 2, ll. 57-67).

In this regard, Obeng et al., teaches away from Applicants' claimed invention. Specifically, the reference expressly discloses that a halogen based plasma etch and a gas such as N<sub>2</sub> should ***not be introduced into a process chamber in the same step*** but should, instead, be introduced in entirely different steps in order to reduce any halogen contaminants present from the halogen based plasma etch step. (*Id.* at col. 3, ll. 23-42; see especially col. 3, ll. 27-28 ("Thereafter the device is subjected to further processing steps to remove from the device any halogen contaminants.")). Indeed, the reference teaches evacuating a process chamber to a "base, sub-atmospheric pressure" between the halogen based plasma etch step and the step in which a gas such as N<sub>2</sub> is introduced. (*Id.* at col. 3, ll. 28-34). The reference continues by noting that "Preferably, the chamber is cycle purged a number of times. That is, the chamber is evacuated and back-filled with an inert

gas (e.g., nitrogen) a number of times in an attempt to purge the chamber of any reactive gasses.” (Id. at Col. 3, ll. 39-42). Thus, Obeng et al. clearly disclosed that the gas selected from, *inter alia*, O<sub>2</sub> and/or N<sub>2</sub> was not to be introduced in the same step as the halogen based plasma etch step and, indeed, was not even used for the purpose of etching. Accordingly, for this additional reason, Ding et al. and Obeng et al. do not render amended claims 1 and 16 obvious. The combined references simply do not teach or suggest an etching composition comprising “at least one carbon containing gas; a halogen-based plasma; and a gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, and mixtures of the same.”

The Examiner has additionally rejected claims 8-12 under 35 U.S.C. § 103 “as being unpatentable over Ding et al. [5,814,563] in view of Obeng [6,162,733] as applied to claim 1, 2, 3 and 6 above, and further in view of Kito et al. [6,867,450].” (Office Action, page 6). Applicants submit that this rejection has been traversed for the reasons set forth above with regard to Ding et al. in view of Obeng.

Accordingly, Applicants submit that claims 1, 3-12, and 15-16, and 18-20 are in immediate condition for allowance.

**Conclusion**

In view of the foregoing, the rejections should be withdrawn and all pending claims should be allowed.

If prosecution may be further advanced, Examiner is invited to telephone the undersigned to discuss this application.

Applicants believe no fees are due in conjunction with the filing of this Amendment. However, if any additional fees are due, such as a fee for a further extension of time, please charge the fees to Deposit Account No. 22-0185.

Dated: April 10, 2007

Respectfully submitted,

/Matthew J. Mason/  
Matthew J. Mason, Reg. No. 44,904  
Connolly Bove Lodge & Hutz LLP  
1990 M Street, N.W., Suite 800  
Washington, DC 20036-3425  
(202) 331-7111  
(202) 293-6229 (Fax)  
Attorney for Applicant